Abstract title: Delta-doped CCDs as stable, high sensitivity, high resolution UV imaging arrays

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Abstract : The large format and low noise of charge-coupled devices (CCDs) render them ideal for many applications. However, the detection of ultraviolet light has been a long-standing problem, due to the short absorption length of UV photons in silicon (e.g., 4 nm absorption length at 270 rim). Backside-illuminated, thinned CCDS exhibit low, unstable quantum efficiency due to a backside potential well which is caused by positive charge at the Si/SiO_2 int erface.

Delta-doped CCDs, developed at JPL's Microdevices Laboratory, have achieved stable 100% internal quantum efficiency, at the theoretical limit imposed by reflection from the Si surface and absorption in the native oxide layer. In this approach, an epitaxial silicon layer is grown on a fully-processed commercial CCD using molecular beam epitaxy. During the silicon growth on the CCD, 30% of a monolayer of boron atoms are deposited nominally within a single atomic layer, resulting in the effective elimination of the backside potential well. This process is not limited to a particular manufacturer and has been demonstrated on CCDs manufactured by EG&G Reticon and Loral. To achieve significantly higher total quantum efficiency, direct deposition of antireflection coatings, optimized for the 250-400 nm region, has been demonstrated, Work on antireflection coatings for wavelength regions below 200 nm is currently underway. We will discuss these results as well as the delta-doped CCD concept and process.

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Brief Biography: Shouleh Nikzad received a Ph.D. in Applied Physics from Caltech in 1990. I ler Ph.D. thesis research involved the first systematic studies of ion bombardment of binary compounds with laser-based analysis. After a postdoctoral fellowship at Caltech where she contributed to the fundamental studies of nucleation and growth kinetics of ion beam-assisted thin film growth and helped develop an *in situ* technique (REELS) for analysis of group IV materials during MBE growth, Dr. Nikzad joined the technical staff at JPL in November 1992. Her current research involves implementing REELS for analysis of II I-V devices and developing delta-doped CCDs and their applications.